

THE CONTRIBUTION OF ERGONOMICS TO THE PREVENTION OF MUSCULO-SKELETAL LESIONS AMONG AMBULANCE TECHNICIANS

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The Association pour la santé et la sécurité, secteur affaires sociales du Québec (ASSTSAS) has worked with three ambulance companies to develop and implement a training program for Québec's ambulance technicians on patient handling strategies that are respectful of both the needs of the patients and the biomechanical limitations of the technicians. The lifting strategies used by the ambulance technicians to transfer patients from one surface to another were questioned and new strategies, based on sliding techniques, were developed. Further research is required to design ambulance equipment that is not only better suited to the patients' needs, but also more appropriate for the ambulance technicians' work, in order to help prevent workplace accidents.

INTRODUCTION

In the period 1994 to 1998 in Québec, some 4406 incidents leading to financial compensation occurred among 3500 ambulance technicians following injury-causing accidents. A high percentage of these injuries (48%) were to the back and shoulders, and were due to excessive effort (49%) during or after the handling of patients (CSST, 1998).

During 1997, at the request of Québec's ambulance community, a training program was developed and implemented for ambulance technicians, to prevent musculo-skeletal injuries caused during patient handling activities. The goal was to teach the ambulance technicians new ways of performing their most frequent patient handling tasks in compliance with generally accepted ergonomic principles.

In this paper, we begin by describing the basic elements of our intervention with the ambulance technicians, and then summarize the main recommended handling principles. This is followed by an explanation of the common pattern observed in problem manoeuvres, and lastly by illustrations

of two strategies taught to the technicians during the training sessions.

METHODOLOGY

We worked with three ambulance companies representative of various aspects of Québec's ambulance sector. Investigation techniques were implemented to gather information on the ambulance technicians' work (survey of 215 technicians, analysis of 139 workplace accidents, and extensive field observation). The results were analyzed and new patient handling strategies respectful of ergonomics principles were identified. The new strategies were taught to the technicians in a one-day training session, and were then tested, corrected and validated in everyday use by the technicians, in cooperation with trained instructors. The entire process is continually assessed in the field by the ambulance technicians and their instructors.

RESULTS

Problems Related to Patient Handling

An analysis of 139 accidents selected at random in the three ambulance companies showed that one

of the activities presenting the highest risk of accident for the technicians was the transportation of equipment on which patients were sitting or lying in staircases, elevators or in the street (24% of accidents). This was followed by three other high-risk activities, namely patient handling and transfers (14%), the handling of equipment with the patient (13%) and the loading/unloading of stretchers containing patients into or out of the ambulance (12%).

This first portrait of the problems experienced by ambulance technicians allowed the organizations making the initial request for assistance to understand the inherent limitations of the task, and to arrive at their first conclusion, to the effect that although it was possible to help the technicians broaden their choice of handling strategies to meet the needs of their patients without harming their own well-being, this was not the only problem. Equipment design (stretcher activating devices, the lack of brakes on the stretchers, etc.), ambulance design (e.g. the height of the vehicle when stretchers are loaded) and the lack of suitable equipment for certain activities (e.g. transporting patients in staircases) were also responsible for a large percentage of accidents, and therefore needed to be addressed at the same time.

Handling Principles and Accessories

One basic principle that the ambulance technicians need to consider in their new patient handling strategies is to respect both the capacities and needs of their patients and the biomechanical limitations of their own bodies. This can be done by avoiding effort while in extreme postural positions and by using their thigh muscles or the weight of their own bodies to move the patient. Another strategy is to save their energy by identifying techniques that involve the patient in the transfer activity, bearing in mind his or her physical and clinical capacities. Lastly, the technicians must constantly seek to reduce lifting activities, as far as possible, by sliding, rolling and rotating the patient to achieve the transfer from one surface to another.

To help with the sliding technique, a board (Figure 1) developed by ASSTSAS can be used to

create a bridge between two surfaces, over which the patient can be slid. The accessory was tested by the ambulance technicians at the training course, and all the teams now have these boards so that they can use the new strategies in their everyday work.

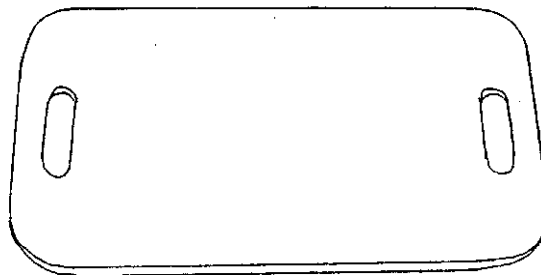


Figure 1: The board used to slide the patient

Common Pattern in Difficult Manoeuvres

The typical method used by a pair of technicians to transfer a patient from one surface to another involves standing one on each side of the departure and arrival surfaces, taking a sheet, mattress pad or other object that can be grasped firmly, and upon a cue lifting the patient from the departure surface to the arrival surface.

Our observations revealed that this method was used to transfer patients from their own beds onto stretchers, from ambulance stretchers to hospital stretchers, from beds to chair stretchers, and in several other manoeuvres too, for example to adjust the patient's position on a hospital or ambulance stretcher where the initial position is incorrect.

As Figure 2 shows, when transferring patients from their own beds to ambulance stretchers, the bulk of the effort seems to come from the back and arms. The arms of the two technicians are bent at several points in the transfer operation. They also work with their arms outstretched when transporting loads, and consequently have to make a significant muscular effort to complete the manoeuvre while retaining their balance.

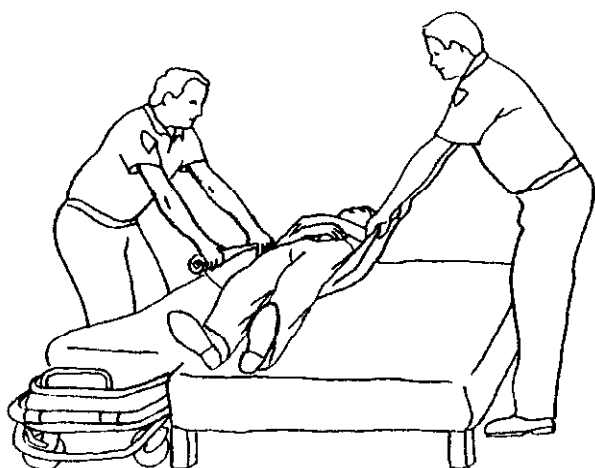


Figure 2: Lifting and transferring a patient from a bed to the ambulance stretcher

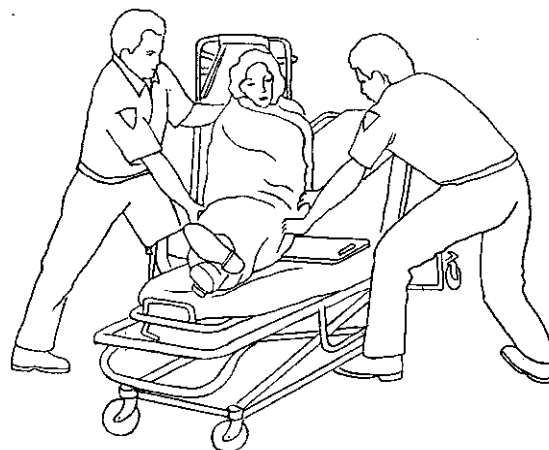


Figure 3: Sliding the patient from a chair stretcher to an ambulance stretcher, using the board

New strategies Taught

The principle underlying the new strategies differs from the typical pattern in that the technicians, as far as possible and depending on the patient's pathology, must try to slide the patient from one surface to another, rather than lifting. This involves the use of the board described earlier, which is inserted under the patient's body. Then, using their thigh muscles or body weight, the technicians transfer weight forwards, backwards or sideways to move the patient.

The following diagrams show sample applications of the strategies taught. The first (Figure 3) shows a transfer from a chair stretcher to an ambulance stretcher, and the second (Figure 4) shows a transfer from an ambulance stretcher to a hospital stretcher. In all cases, the technicians use specially-developed cues to synchronize their movements as they slide the patient from one surface to the other with a minimum of effort.

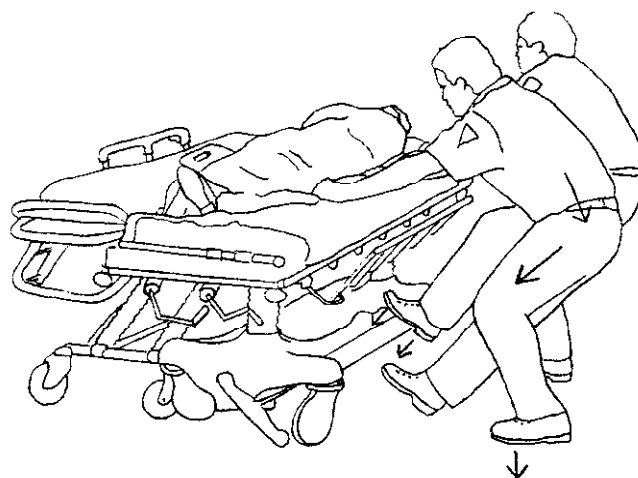


Figure 4: Sliding the patient from an ambulance stretcher to a hospital stretcher, using the board

CONCLUSION

Based on the number of requests for instructor training received from ambulance companies throughout Québec, we are inclined to think that a high percentage of ambulance technicians have benefited or will shortly be benefiting from the training program. The only regret expressed by the technicians and instructors trained so far is that the program was not implemented sooner, since it would have helped them avoid wear and tear on their joints and in many cases would have extended their careers. The colleges offering ambulance technician training programs have already certified their teaching staff as ASSTSAS-trained instructors, and this bodes well for new ambulance technicians coming into the profession.

In addition to the training activities described above, ASSTSAS has undertaken a number of studies with partners to gather information on the criteria required of future generations of equipment produced by manufacturers in order to meet the needs of the profession. The goal of our intervention is to support Québec's ambulance companies so that they can include the new criteria in the requirements they submit to their equipment suppliers. We are firmly convinced of the human relevance and economic viability, for employers and technicians alike, of equipment that satisfies real ergonomic criteria. We believe the design criteria of these new products should include not only concerns relating to the clinical needs of patients, but also the ambulance technicians' concerns for their own welfare and a better quality of life at work.

* The ASSTSAS (Association pour la santé et la sécurité du travail, secteur affaires sociales – Occupational Health and Safety Association, Social Affairs Sector) is a non-profit joint association.

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REFERENCE

CSST (1998), Registre national des lésions professionnelles, Québec, Canada.